Shale Gas & New Petrochemicals Investment in Pennsylvania

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This analysis is an addendum to the previous ACC analysis completed in March 2011, titled *Shale Gas and New Petrochemicals Investment: Benefits for the Economy, Jobs, and US Manufacturing.* That report presented the results of an analysis conducted to quantify the economic impact of the additional production of petrochemicals and downstream chemical products stimulated by an increase in ethane availability. This present analysis focuses on the benefits to the state of Pennsylvania should a new petrochemicals complex be constructed in that state. It specifically examines the additional output, jobs and tax revenues generated from a private sector investment in petrochemicals.

That Pennsylvania could be the site of a new petrochemicals complex to take advantage of the lower feedstock costs arising from shale gas is obvious. Pennsylvania features the ninth largest state chemical industry in the United States, with revenues of over $25 billion and employing nearly 43,000 people in chemical manufacturing operations. The western part of the state sits on top of the Marcellus shale formation which is estimated to contain 84 trillion cubic feet of natural gas. Logistical and other significant infrastructure is present as well. The state features access to the Great Lakes and the Ohio River Valley (and beyond), and major rail lines, as well as excellent universities (University of Pennsylvania, Penn State University, University of Pittsburgh, Lehigh University, Carnegie Mellon University, etc.) with strong chemistry, materials science, polymer science, and chemicals engineering departments. Furthermore, Pennsylvania is within 500 miles of most of the US industrial base.

Because petrochemical investment has shifted towards the Gulf Coast in recent decades, there is little excess petrochemicals capacity in Pennsylvania that could be restarted to take advantage of shale gas developments. The analysis thus assumes the construction of "greenfield" facility, including a hypothetical 1.0 million metric ton per year world-class ethylene cracker as well as affiliated polyethylene and other downstream derivative plants. In addition to these battery limit process plants, investment for site development, utilities, logistics and other site-affiliated infrastructure is included. In total, such a petrochemicals complex would necessitate a $3.2 billion investment. In addition, the renewed availability of these basic chemicals would also likely foster additional output of high value-added chemistry products as well. In the long-term, this would add $4.8 billion in additional chemical industry output. The IMPLAN model was employed to assess the direct, indirect and induced effects of petrochemicals investment in Pennsylvania. The benefits to the Pennsylvania economy would be manifold.

The output and employment generated by additional ethane utilization in the petrochemical and derivative industries would be significant. The additional $4.8 billion in chemical industry activity would generate over 2,400 high-paying, desirable jobs in the Pennsylvania chemical industry. Innovative, creative and pacesetting, the business of chemistry is one of the most knowledge-intensive industries in the manufacturing sector.

Table 1: On-Going Economic Impact in Pennsylvania from New Petrochemical Production in Pennsylvania

Impact Type	Employment	Payroll ($ Million)	Output ($ Billion)
Direct Effect	2,396	$347	$4.8
Indirect Effect	8,194	$571	$2.2
Induced Effect	6,951	$303	$0.9
Total Effect	**17,541**	**$1,221**	**$7.9**

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In addition, new petrochemical production in Pennsylvania would generate purchases of raw materials, services, and other purchases throughout the supply chain[1]. Thus, an additional more than 8,200 indirect jobs would be supported by the boost in ethane utilization in the state. Finally, the wages earned by new workers in the chemical industry and workers throughout the supply chain are spent on household purchases and taxes generating about 7,000 payroll-induced jobs in the state. All told, the additional $4.8 billion in Pennsylvania chemical industry output could generate $7.9 billion in output to the Pennsylvania economy and more than 17,000 new jobs in Pennsylvania generating a payroll of nearly $1.2 billion.

Table 2: Economic Impact in Pennsylvania from New Investment in Plant and Equipment in Pennsylvania

Impact Type	Employment	Payroll ($ Million)	Output ($ Million)
Direct Effect	5,987	$354	$919
Indirect Effect	1,922	$117	328
Induced Effect	3,586	$156	457
Total Effect	**11,495**	**$627**	**$1,703**

The one-time $3.2 billion investment in a Pennsylvania petrochemical complex would result in more than $900 million in spending inside the state of Pennsylvania. The remaining $2.3 billion is used to purchase equipment and supplies produced outside the state. This investment in plant and equipment generates over 6,000 jobs in Pennsylvania, mostly in the construction and capital equipment-producing industries. Indirectly, another $328 million in output and 1,900 jobs would be generated throughout the supply chain. Finally, a further $457 million in output and more than 3,600 jobs would be created through the household spending of the workers employed building, making, and installing the new plant and equipment as well as those employed throughout the supply chain. All told, a $3.2 billion investment in the Pennsylvania chemical industry would support more than 11,000 jobs and $630 million in payrolls in Pennsylvania.

Table 3: Tax Impact in Pennsylvania from New Petrochemical Production in Pennsylvania ($ Million)

Impact Type	Payroll	Households and Proprietors	Corporations and Indirect Business Taxes	Total
Federal	$111.3	$66.0	$63.6	$240.8
State and Local	$1.0	$7.3	$132.3	$140.6

Table 4: Tax Impact in Pennsylvania from New Investment in Plant and Equipment in Pennsylvania ($ Million)

Impact Type	Payroll	Households and Proprietors	Corporations and Indirect Business Taxes	Total
Federal	$63.6	$39.6	$19.4	$122.6
State and Local	$0.6	$4.3	$36.9	$41.8

[1] While much of the supplies and materials are sourced from Pennsylvania businesses, other purchases come from outside the state. Because this analysis focuses on the impact to the state of Pennsylvania, those impacts are not considered.

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The IMPLAN model (for Pennsylvania) also allows a comprehensive estimation of additional tax revenues that would be generated across all sectors as the result of increased economic activity. With new petrochemical production in the state, the additional jobs created and added output would lead to a gain in tax receipts. State and local taxes on payrolls, households, and corporations would yield about $141 million per year to Pennsylvania governments. Furthermore, Pennsylvania revenues would rise by $42 million during the investment phase of the project.

ACC Economics & Statistics Department

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